

Performance comparison of video encoding at low sampling rates

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Abstract

Video encoding is challenging in the energy-constrained environments Wireless Multimedia Sensor Networks (WMSN) operate. Among the many design considerations when developing a video encoding scheme, the first is the sparsity transform, however, the question of which transform is most suitable has not been conclusively answered. Three of the most popular transforms in video encoding literature, discrete cosine (DCT), discrete wavelet transform (DWT) and discrete Tchebichef transform (DTT) were tested against each other under low sampling rates using compressed sensing techniques. The transforms were evaluated using image quality and energy consumption. The image quality was measured using both peak signal to noise ratio (PSNR) and structural similarity (SSIM). The energy consumption was evaluated using the TelosB mote as a reference. The DCT transform had the best image quality at all the sampling rates while the DTT had the worst performance and failed to recover the image at very low sampling rates. Contrary to conventional wisdom, the DTT had higher energy consumption than the DCT. Another remarkable finding was that at high distortion, PSNR was a better predictor of image quality than SSIM. Overall, the DCT was shown to be best image transform in terms of both image quality and energy consumption.